

bridge, and who was excellently qualified for the task, should take Sullivant's place in the undertaking, but he died in 1882, and Lesquereux, in old age with his sight failing, was again left alone. The book might have altogether collapsed if it had not been for the kind intervention of Dr. Sereno Watson, who now has charge of the Harvard Herbarium, and who, although not specially a bryologist, has taken upon himself the needful critical and editorial labour that was required to complete it.

The book as now published includes all the mosses which are known on the North American continent within the limits of the United States and northwards. There is already a "Manual of the Mosses of Tropical America," by Mitten, in the twelfth volume of the *Journal* of the Linnean Society, and there are special monographs by Bescherelle on the mosses of Mexico and the West Indies. Sullivant has published figures of most of the endemic types, and Drummond, Austin and Sullivant and Lesquereux have issued extensive sets of dried specimens with numbers and printed labels. In the present work 900 species are included. A very large proportion of them are European, and as the close identity of the moss-flora of the temperate zone in the two continents is so interesting and important from a geographical point of view, we should have been glad if the example of Dr. Gray in marking those species which are common to Europe and America had been followed. Of the six plates five are those which were sketched out by Sullivant, and the sixth is devoted mainly to the sections of Hypnum. The classification does not differ materially from that of Bruch and Schimper, familiar to us in England from being used in Wilson's "Bryologia." The definitions of species and genera are commendably full and clear, and in not establishing or admitting species upon a slender foundation of differential character, the authors have followed the excellent example that has made Dr. Gray's manual, which has now reached its fifth edition, one of the most popular and practically useful of botanical handbooks.

At the end there is a useful glossary of the technical terms used in the descriptions. As it is such a good and cheap book and includes such a large proportion of the British species, it is well worthy of the attention of our home collectors.

J. G. BAKER

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

The Diffusion of Species

DURING a recent cruise among the Hebrides two circumstances came before me, both of which are of some interest in natural history—one of them illustrating the curious conditions attending the diffusion of species, and the other illustrating the not less curious conditions affecting the multiplication of particular species in particular seasons.

The celebrated Island of Iona is separated from the nearest part of the Isle of Mull by a sound which is three-quarters of a mile wide. It is the channel of very strong tidal currents, and

when the winds blow in certain directions a heavy sea runs through it. This sound has been an effectual isolator of Iona from the access of several species common in Mull. Among others are to be numbered snakes and other reptiles. Tradition ascribes the immunity of the sacred isle to the blessing of St. Columba. Certainly it has been complete. Yet, strange to say, this immunity has been this year endangered. During the late very hot August an adder attempted the passage to Iona, and was in the act of effecting a successful landing, when, fortunately, it was seen by a boy and a girl who were occupied among the stones on the sea-shore. The adder was tired by its long swim, and the boy killed it without difficulty by stamping on its head. This is surely a very curious case of migration; and it is difficult to conceive the impulse under which the snake committed itself to the tides and currents of a channel so broad and dangerous. The hot weather of this year has no doubt developed in all reptiles an abnormal activity; and I saw a youth in Mull who had recently very nearly lost his life from the bite of an adder. The description given me of his condition for many hours brought home to my mind almost for the first time that we have in our own island a veritable member of the terrible "Thanatophidia." But it seems quite unaccountable why such a reptile should have attempted to cross the Sound of Iona.

The other circumstance to which I have referred is the marvellous development of the Salpidæ this year in the Hebridean seas. I have cruised on those seas every year for fifteen years regularly, and I have been often on the look-out for these curious organisms; yet I have never seen them at all except once, and then only rarely and locally. Whereas this year the water was laden with them almost everywhere, and in some places it was rendered almost foul with their enormous quantity. In the Sound of Iona my tow-net was soon half filled with them; and the long chains of beautiful pattern which passed under the yacht lent an additional charm to the exquisite colour of that pure oceanic water. In the Sound of Raasay, near Portree, the number was still greater. But the maximum development appeared in Loch Scavaig, where, as far down as the eye could reach, there was nothing to be seen but Salpæ in every variety of concatenation and decatenation—long chains, short chains, and countless myriads of separated individuals—making the whole sea little more than a thick soup of Salpæ.

On being placed in a glass of water the muscular contractions of their bodies were beautifully exhibited, and their darting movements were very striking. Their exquisite crystalline material allowed every detail of structure to be seen; and on being placed in numbers in a bucket of water, and on being stirred at night, their phosphorescence was brilliant.

I should be glad to know from any of your correspondents whether there is any explanation of this exceptional development of these creatures.

ARGYLL

Inveraray, September 6

Meteor- Moon- and Sun-Shine

DESCENDING the Calton Hill from the Royal Observatory on Tuesday night, I was much struck with the appearance, though momentary only, of a fine meteor of Venus-like brightness, passing in a short course from south-east to north-east nearly horizontally, and at a height of about half a degree above the Pleiades, at 3 minutes past 12 G.M.T. The yellowness of the meteor's light was very conspicuous, contrasted with the blueness of the faint stars and of the sky about them in that direction, shimmering in pale blue reflected moonlight; and seemed to speak of abundance of sodium, as well as a low temperature of incandescence, in that particular meteor.

But very different was the colour in the opposite quarter of the sky, or just west of south, where the moon, within a day of the full, was shining brilliantly, in white light immediately around and above it, but producing between it and the horizon, and for a considerable distance on either side, exactly and most perceptibly that faintly claret-coloured haze, which I have been remarking about and beneath the sun all this year. Precisely too as with the sun, the colour was shown on this occasion with the moon to be in the very highest regions of the atmosphere by any cumulus clouds, at heights of 3000 or 4000 feet, that floated past, being pre-eminent on that warm-coloured backing, by the pearly whiteness of their lights and blueness of their shadows. In so far quite agreeably with Mr. Backhouse's recent and very interesting letter in NATURE (p. 359), stating that he had

found a solar dust-halo, with effects like the above, more and more visible the higher he ascended amongst the Alps.

That such appearances were produced by solid particles in a cold state, and not by any new gas introduced into the atmosphere, seems to be borne out by three sets of rather extensive solar spectroscopings which I have lately carried out; for while there does not seem to be a single new line amongst the thousands of old ones, so far as I have yet examined the observations, there is only too abundant evidence of a continued dulling of the light of the sun's continuous spectrum all along its range.

This effect is of course more conspicuous in the faint regions at either end than in the bright middle, and would appear to be testified to undeniably by the following differential observation, viz. that with a prismatic apparatus, wherewith I could see lines in the bright regions, say of B, C, and D, rather better than I could with somewhat similar, but darker, prisms in 1877,—I could not see Brewster's line Y and its companion groups in the very faint ultra-red so well as I did then; and could not see the further-away line X at all, though in 1877 it was not only clear enough, but far fainter lines on either side of it were visible and micrometrically measurable. Neither in 1884 have I been able with the same eye and instrument to see anything at the violet end of the spectrum of the grand banded lines H and K, though they formed a daily subject of observation in 1877.

In 1856 I remarkably appreciated that an ascent to 11,000 feet of altitude on the Peak of Teneriffe enabled II and K to be seen with peculiar distinctness and fine resolution of much of their haze at lower levels into sharp lines; but would that have been equally the case this year, when the inhabited regions of the earth, and the lower clouds too, are covered in by a widespread blanket of dust in most anomalous extent and density?

C. PIAZZI SMYTH

Astronomer-Royal for Scotland

15, Royal Terrace, Edinburgh, September 6

Pons' Comet—Pink Glow

THIS comet was visible here up to the beginning of June. I saw it on fourteen nights in April and eighteen in May, including the last eleven nights of the latter month. It could be seen with an opera-glass up to April 3; my last sight of it was with a 4-inch telescope on June 1, or rather at 12.30 a.m. of June 2 (= June 1d. 1h. G.M.T.). On April 24, and again and particularly on May 24 it seemed to me to have become suddenly fainter, though there seemed nothing in the state of the sky to account for it; indeed, on the last-named night I have noted, "sky very clear." Up to at least May 28 its motion in two or three hours could be plainly seen. On that night, though "very diffused and faint," it was visible before the moon had set. It had not, I think, on June 2 reached the *minimum visibile*, but as I had no ephemeris subsequent to that (to the middle of April) given in NATURE, it would have been quite useless to have looked for it again after the moon had passed.

I may add that the "pink glows" have not yet left us; on the last two evenings (July 1 and 2), which were clear, they were very distinct.

A. S. ATKINSON

Nelson, N.Z., July 3

Alternation of Generations in Salpa

WHILE we are indebted to Prof. W. K. Brooks for having enunciated his views on this subject clearly in NATURE for August 14 (p. 367), I should like to point out that the misquotations which he has called attention to in an article of mine published in May (p. 67) do not invalidate the strength of the counter-arguments, although I must apologise for their having been allowed to appear.

He does not acknowledge that the question at issue is one not of fact but of the explanation of accepted fact, *i.e.* it is a question of theory. Undoubtedly an egg migrates from the body of the solitary Salpa to that of the chain form, but Kowalevsky, who himself describes this, does not agree with Prof. Brooks' conclusion drawn therefrom.

Prof. Brooks pointed out at greater length than I did that the phenomena found in Pyrosoma and Composite Ascidiaceans culminate in those in Salpa. Beginning in Pyrosoma with "an indefinite series of hermaphrodite buds," he shows how the reproductive cell becomes marked out earlier and earlier, until in Salpa it is fully developed in the body of the gemmating individual. Then, instead of showing by his nomenclature that

Salpa is the end of a series, he prefers to break loose from any attempt at continuity and to call the solitary Salpa a true female.

I, however, prefer to follow in the steps of Prof. Moseley, who says of similar changes in the Hydromedusæ, that "it would lead to great confusion if the old way of regarding the matter was upset. The past history of the gonophores must be taken into account, and the fact that the sexual elements, though now developed at a greater or less distance in many species, formerly undoubtedly originated within the gonophore."

As Prof. Brooks does not use language in this way, it is not remarkable that he criticises me for using the term "hydroid" in regard to Cunina at a stage *comparable* to the hydriform and gemmating person of a Sertularian, although I pointed out that it is a Medusa in both generations.

The fault of Prof. Brooks' argument is that he is not consistent. He says: "Very many chain Salpæ are produced at one time. As these have no power to reproduce by budding, they have *lost their ovaries*, although each of them when it is born contains, like the bud of Pyrosoma, a single unfertilised egg."

If this means that the egg is the sole remnant of the ovary, it admits all that I contend for; but if, on the other hand, it means that in a less modified condition these must have an ovary proper to the bud as well as the ovum received from the solitary Salpa, it follows that Salpa cannot be differentiated from a form like Pyrosoma, where there is, so to speak, a migrating ovary, but no trace of ovary independently formed in the bud. The second ovary described by Salensky cannot be a trace of this, for it is simply another ovum with follicular covering precisely like the first.

R. N. GOODMAN

St. John's College, Cambridge

Forked Lightning

BY papers received by last mail I see that Mr. W. C. Gurley claims to have shown, by photographing a flash of lightning, that the ordinary notion of *forked* lightning must be given up. I do not know whether this conclusion has been drawn from the photograph of a single flash or not, but you will see from the inclosed photographs that the conclusion is an entirely false one. An examination of my photographs will show that all the flashes except one had the zigzag form, and that some of them are magnificently forked. They resemble very closely the photographs of sparks from a Holtz electrical machine, taken by Mr. A. Matheson in Prof. Tait's laboratory, and published in vol. xxvii. Part 3, of the *Transactions* of the Royal Society of Edinburgh. The amount of detail shown in the photograph of the tree illuminated by the flash gives one a very good idea of the brightness, when we consider that exposure cannot have exceeded the millionth part of a second. I may add that my first photograph was taken on October 16, 1883, and was circulated amongst friends immediately afterwards.

C. MICHIE SMITH

Madras Christian College, Madras, August 9

Sun-Glows

As one of the first to draw attention in the *St. James's Gazette* of October 1, and November 9, 1883, and many subsequent occasions, to those strange phenomena about the sun last autumn, will you kindly allow me space in your valuable columns to ask how it is possible to refer such effects any longer (as Mr. Backhouse does in your paper of August 14, p. 359) to volcanic dust from, I presume, the Krakatoa eruption, when we know now that in south latitudes these phenomena were observed by Mr. Neison of the Natal Observatory as early as the spring of 1883? He says that "they increased in intensity from February until June, when they were strongly marked." I have watched the sky as an artist (out of London) for quite forty years, and feel sure that this corona, or blanching of the sun, has been a more persistent feature of late years than formerly. It is still there, and may be seen without leaving England, or even London in clear weather, by looking for it from about an hour to half an hour before or after sunset and sunrise. The last very mild winter and the preceding one could have had no connection with the Krakatoa eruption, and I think that we must now seek for an explanation of the present and past atmospheric phenomena in some increase of solar energy, and consequent lifting of vapour higher than usual.

ROBERT LESLIE

6, Moira Place, Southampton, August 24